INFRASTRUCTURE MALTA SPECIFICATION FOR ROAD WORKS

SERIES IM/1200 (IMPLEMENTATION)

TRAFFIC SIGNS

This Specification Series implements the requirements in Subsidiary Legislation 499.57, Part II (New Roads and Road Works Regulations) in accordance with the Agency for Infrastructure Malta ACT XXV111, CAP. 588, Part I

Date: **December 2021**
Version: **V1.0**

1200 TRAFFIC SIGNS

1201 Regulations, Sign Classification and Standards

Regulations

1 Subject to paragraphs 2 and 3 below, all traffic signs used (including retroreflecting road studs and road markings), whether permanent or temporary, shall be of the size, shape, colour and type prescribed for that use in KAP.65. and S.L.65.05. and subsequent amending Regulations. Other relevant requirements are contained in the above Regulations and General Directions.

2 Signs that are not prescribed in Regulations need to be specially authorised by Transport Malta or subsequent transport authority bodies in Malta. Where the Contractor proposes to use non-prescribed temporary traffic signs, he shall obtain the agreement of the Overseeing Organisation to their intended design and location. Where the Contractor proposes to use prescribed temporary traffic signs, he shall obtain the agreement of the police and the highway authority to their intended location. The Contractor shall obtain authorisation and approval from the Overseeing Organisation for the use of the signs at the specific locations proposed.

3 Signs that are changeable by means other than the purely mechanical require statutory type approval for their construction and operating mechanisms by the Transport Malta or subsequent transport authority bodies in Malta. This requirement is in addition to the need for the design of the sign to be prescribed or specially authorised. The Contractor's proposal for signs that require statutory type approval shall include the reference numbers of any approval already issued in respect of that equipment. The signs shall not be installed until appropriate approval or confirmation of existing approval, by the Overseeing Organisation has been obtained.

Sign Classification

4 For the purposes of the Contract the following classifications apply:

a) permanent traffic signs. Any of the traffic signs prescribed in KAP.65. and S.L.65.05., or specially authorised by Transport Malta or subsequent transport authority bodies in Malta, or any part thereof, designed to remain in position at the completion of the Permanent Works or a traffic cone, cylinder or other traffic delineator to be retained by the Employer;

b) prescribed temporary traffic signs. Any of the traffic signs defined in KAP.65. and S.L.65.05 Regulations, or specially authorised by Transport Malta or subsequent transport authority bodies in Malta, or any part thereof, described in IM Appendix 12/1 which, unless otherwise described in IM Appendix 12/1, comply with the requirements of a permanent traffic sign but which will not remain in position at the completion of the Permanent Works;

c) temporary traffic signs. Any of the traffic signs defined in KAP.65. and S.L.65.05., or specially authorised by Transport Malta or subsequent transport authority bodies in Malta, or any part thereof, designed by the Contractor, in compliance with Clause 1216 which will not remain in position at the completion of the Permanent Works.

1202 General Requirements for Permanent Traffic Signs

1 Materials for permanent traffic signs and their construction, assembly, location and erection shall comply with this Series and Series 1400. The manufacture and installation of traffic signs shall be in accordance with the quality management scheme described in IM Appendix A of MCHW Volume 1.

2 Each complete traffic sign or part thereof shall comply with and be capable of passing the tests of MSA EN 12899-1.

3 Before the commencement of fabrication of any non-prescribed traffic sign described in IM Appendix 12/1, the Contractor shall submit fabrication drawings for the Client's approval.

4 The backs of traffic signs shall be grey.

5 All signs shall be permanently marked on the reverse with the name or code of the manufacturer together with the month and year of manufacture. The markings shall be discrete but clearly visible upon inspection and comply with the requirements of the Traffic Signs Regulations and General Directions.

6 Traffic signs shall be carefully handled to prevent damage and transported and stored in accordance with the sign face manufacturer's instructions.

7 All signs shall be covered by a minimum manufacturer's guarantee of 12 years.

8 Transilluminated traffic signs shall comply with BSEN 12899-1 and meet Class L2 and Class U3 of that standard.

1203 Foundations for Permanent Traffic Signs and Signals

1 The type and size of foundations for permanent traffic signs and signals shall be as described in, and unless otherwise stated therein shall comply with, this Clause.

2 All excavations for foundations shall be carried out in compliance with Clause 604 and shall be cleared of all loose material before placing of concrete and backfilling.

3 Unless otherwise described in IM Appendix 12/1 traffic signs and signals supported by a single post placed in the ground shall have the post installed centrally in foundations as described in Table 1200-1 filled in compliance with Clause 2602 with mix ST2 concrete to within 150 mm of the ground surface.

Table 1200-1: Sign Foundation Sizing (mm)

Post Foundation Sizing				
Foundation Reference	**Width "W"**	**Depth "D"**	**Length "L"**	**Notes**
A	350	600	600	Refer to Drawing TM 35/11
B	400	600	600	Refer to Drawing TM 35/11
C	400	600	800	Refer to Drawing TM 35/11
D	450	700	1000	Refer to Drawing TM 35/11
E	450	800	1000	Refer to Drawing TM 35/11
F	500	900	900	Refer to Drawing TM 35/11
G	500	900	1300	Refer to Drawing TM 35/11
H	600	1000	1200	Refer to Drawing TM 35/11
I	600	1000	1800	Refer to Drawing TM 35/11

Table 1200-2: Sign Post Size Equivalents

Equivalent Post Sizing	
Circular Post (mm)	**Notes**
76 x 4	None
89 x 5	# Sign mounted at right angles to 100mm channel side
114 x 6.3	# Sign mounted at right angles to 100mm channel side

Table 1200-3: Traffic Signpost Details and Foundations - Sign areas up to 1.50m²

Height to Centroid		Area of sign (m²)																	
From	To	Up to 0.25			0.26 - 0.5			0.51 - 0.75			0.76 - 1.0			1.01 - 1.25			1.26 - 1.50		
4.26	4.50	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			89	76		114	76		140	89	76	140	114	89	140	114	89
		A			A	A		C	A		C	A	A	D	B	A	E	C	A
4.01	4.25	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			89	76		114	76		114	89	76	140	114	76	140	114	89
		A			A	A		B	A		C	A	A	D	B	A	D	B	A
3.76	4.00	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			89	76		114	76		114	89	76	140	114	76	140	114	89
		A			A	A		B	A		C	A	A	D	B	A	D	B	A
3.51	3.75	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			89	6		114	76		114	89	76	140	89	76	140	114	89
		A			A	A		B	A		C	A	A	D	A	A	D	B	A
3.26	3.50	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			89	76		114	76		114	89	76	114	89	76	140	114	89
		A			A	A		B	A		C	A	A	C	A	A	D	B	A
3.01	3.25	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			76	76		114	76		114	76	76	114	89	76	140	114	76
		A			A	A		B	A		B	A	A	C	A	A	D	B	A
2.76	3.00	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		76			76	76		89	76		114	76	76	114	89	76	140	89	76
		A			A	A		A	A		B	A	A	C	A	A	C	A	A
2.51	2.75	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			76	60		89	76	60	114	76	60	114	89	76	114	89	76
		A			A	A		A	A	A	B	A	A	C	A	A	C	A	A
2.26	2.50	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			76	60		89	60		114	76	60	114	76	76	114	89	76
		A			A	A		A	A		B	A	A	B	A	A	C	A	A

2.01	**2.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			76	60		89	60		89	76	60	114	76	60	114	89	76
		A			A	A		A	A		A	A	A	B	A	A	C	A	A
1.76	**2.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			76	60		76	60		89	76	60	114	76	60	114	76	76
		A			A	A		A	A		A	A	A	B	A	A	B	A	A
1.51	**1.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			60			76	60		89	60		89	76	60	114	76	60
		A			A			A	A		A	A		A	A	A	B	A	A
1.26	**1.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			60			76	60		76	60		89	60		89	76	60
		A			A			A	A		A	A		A	A		A	A	A
1.01	**1.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			60			60			76	60		76	60		89	60	
		A			A			A			A	A		A	A		A	A	
0.01	**1.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		60			60			60			76	60		76	60		76	60	
		A			A			A			A	A		A	A		A	A	

Note:	
	No. of Posts
	Post diameter
	Foundation Type - Refer to Table 1200-1

Table 1200-4: Traffic Signpost Details and Foundations - Sign areas from 1.51 to 3.0 m²

Height to Centroid		Area of sign 1.51 to 3.0m²																	
From	To	1.51 - 1.75			1.76 - 2.0			2.01 - 2.25			2.26 - 2.5			2.51 - 2.75			2.76 - 3.0		
4.26	**4.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	114	140	140	114	168	140	114	168	140	114	168	140	114	194	140	140
		E	C	B	F	C	B	G	D	C	H	D	C	H	D	C	I	E	C
4.01	**4.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	114	140	114	114	168	140	114	18	140	114	168	140	114	168	140	140
		E	C	B	F	C	B	G	D	B	G	D	C	H	D	C	H	D	C
3.76	**4.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	114	140	140	114	168	140	114	168	140	114	168	140	114
		E	C	A	E	C	B	F	C	B	G	D	C	G	D	C	H	D	C
3.51	**3.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	114	140	114	114	168	140	114	168	140	114	168	140	114
		E	B	A	E	C	B	F	C	B	G	D	B	G	D	C	H	D	C
3.26	**3.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	89	140	114	114	140	114	114	168	140	114	168	140	114
		D	B	A	E	C	A	E	C	B	F	C	B	G	D	B	G	D	C
3.01	**3.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	89	140	114	114	140	114	114	140	140	114	168	140	114
		D	B	A	E	B	A	E	C	B	F	C	B	F	C	B	G	D	B
2.76	**3.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	89	140	114	89	140	114	114	140	114	114	140	140	114
		D	B	A	D	B	A	E	C	A	E	C	B	F	C	B	F	C	B
2.51	**2.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	114	76	140	114	89	140	114	89	140	114	89	140	114	114	140	114	114
		D	B	A	D	B	A	D	B	A	E	C	A	E	C	B	E	C	B
2.26	**2.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	89	76	140	114	76	140	114	89	140	114	89	140	114	89	140	114	114
		C	A	A	D	B	A	D	B	A	D	B	A	E	C	A	E	C	B

2.01	**2.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	89	76	140	89	76	140	114	89	140	114	89	140	114	89	140	114	89
		C	A	A	C	A	A	D	B	A	D	B	A	D	B	A	E	C	A
1.76	**2.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	89	76	114	89	76	140	89	76	140	114	76	140	114	89	140	114	89
		C	A	A	C	A	A	C	A	A	D	B	A	D	B	A	D	B	A
1.51	**1.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	76	76	114	89	60	114	89	76	114	89	76	140	114	76	140	114	89
		B	A	A	C	A	A	C	A	A	C	A	A	D	B	A	D	B	A
1.26	**1.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	76	60	114	76	76	114	89	76	114	89	76	114	89	76	140	89	76
		B	A	A	B	A	A	C	A	A	C	A	A	C	A	A	C	A	A
1.01	**1.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		89	76	60	114	76	60	114	76	60	114	76	76	114	89	60	114	89	76
		A	A	A	B	A	A	B	A	A	B	A	A	C	A	A	C	A	A
0.01	**1.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		89	60		89	76	60	89	76	60	114	76	60	114	76	60	114	76	60
		A	A		A	A	A	A	A	A	B	A	A	B	A	A	B	A	A
Note:		**No. of Posts**																	
		Post diameter																	
		Foundation Type - Refer to Table 1200-1																	

Table 1200-5: Traffic Signpost Details and Foundations - Sign areas from 3.01 to 6.0m²

Height to Centroid		Area of Sign 3.01 to 6.0m²																	
From	To	3.01 - 3.5			3.51 - 4.0			4.01 - 4.5			4.51 - 5.0			5.01 - 5.5			5.51 - 6.0		
4.26	**4.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		194	140	140	194	140	140	219	168	140	219	168	140	219	168	140	244	194	140
		I	E	D	*	F	D	*	G	E	*	H	E	*	H	F	*	I	F
4.01	**4.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		194	140	140	194	140	140	194	168	140	219	168	140	219	168	140	219	168	140
		I	E	D	*	F	D	*	G	D	*	G	E	*	H	E	*	H	F
3.76	**4.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		194	140	140	194	140	140	194	140	140	219	168	140	219	168	140	219	168	140
		I	E	C	I	E	D	*	F	D	*	G	E	*	G	E	*	H	E
3.51	**3.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	194	140	140	194	140	140	194	168	140	219	168	140	219	168	140
		H	E	C	I	E	D	I	F	D	*	G	D	*	G	E	*	H	E
3.26	**3.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	194	140	140	194	140	140	194	140	140	194	168	140	219	168	140
		H	D	C	I	E	C	I	E	D	*	F	D	*	G	E	*	G	E
3.01	**3.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	168	140	114	194	140	140	194	140	140	194	140	140	194	168	140
		H	D	C	H	E	C	I	E	D	I	F	D	*	F	D	*	G	E
2.76	**3.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	168	140	114	194	140	140	194	140	140	194	140	140	194	140	140
		G	D	C	H	D	C	I	E	C	I	E	D	I	F	D	*	F	D
2.51	**2.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	168	140	114	168	140	114	194	140	140	194	140	140	194	140	140
		G	D	B	G	D	C	H	D	C	I	E	C	I	E	D	I	F	D
2.26	**2.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

		140	114	114	168	140	114	168	140	114	168	140	114	194	140	140	194	140	114
		F	C	B	G	D	C	H	D	C	H	D	C	I	E	C	I	E	D
2.01	**2.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	114	140	140	114	168	140	114	168	140	114	168	140	114	194	140	140
		E	C	B	F	C	B	G	D	C	H	D	C	H	D	C	I	E	C
1.76	**2.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	114	140	140	114	168	140	114	168	140	114	168	140	114
		E	C	A	E	C	B	F	C	B	G	D	C	G	D	C	H	D	C
1.51	**1.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	89	140	114	114	140	114	114	168	140	114	168	140	114
		D	B	A	E	C	A	E	C	B	F	C	B	G	D	B	G	D	C
1.26	**1.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	89	140	114	89	140	114	114	140	114	114	140	140	114
		D	B	A	D	B	A	E	C	A	E	C	B	F	C	B	F	C	B
1.01	**1.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	89	76	114	114	76	114	114	89	140	114	89	140	114	89	140	114	114
		C	A	A	D	B	A	D	B	A	D	B	A	E	C	A	E	C	B
0.01	**1.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		114	89	76	114	89	76	114	89	76	114	114	76	114	114	89	140	114	89
		C	A	A	C	A	A	C	A	A	D	B	A	D	B	A	D	B	A
Note:		**No. of Posts**																	
		Post diameter																	
		Foundation Type - Refer to Table 1200-1																	

Table 1200-6: 1200 5: Traffic Sign Post Details and Foundations - Sign areas from 6.01 to 9.0m²

Height to Centroid		Area of Sign 6.01 to 9.0m²																	
From	To	6.01 - 6.5			6.51 - 7.0			7.01 - 7.5			7.51 - 8.0			8.01 - 8.5			8.51 - 9.0		
4.26	**4.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		244	194	168	244	194	168	244	194	168	244	194	168	273	194	168	273	219	168
		*	I	G	*	I	G	*	I	H	*	*	H	*	*	H	*	*	I
4.01	**4.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		244	194	168	244	194	168	244	194	168	244	194	168	273	194	168	273	194	168
		*	I	F	I	I	G	*	I	G	*	*	H	*	*	H	*	*	H
3.76	**4.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		245	168	140	244	194	168	244	194	168	244	194	168	244	194	168	244	194	168
		*	H	F	*	I	G	*	I	G	*	I	G	*	*	H	*	*	H
3.51	**3.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		219	168	140	244	168	140	244	194	168	244	194	168	244	194	168	244	194	168
		*	H	F	*	H	F	*	I	G	*	I	G	*	I	G	*	I	H
3.26	**3.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		219	168	140	219	168	140	244	168	140	244	194	168	244	194	168	244	194	168
		*	H	E	*	H	F	*	H	F	*	I	G	*	I	G	*	I	G
3.01	**3.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		219	168	140	219	168	140	219	168	140	244	168	140	244	194	168	244	194	168
		*	G	E	*	H	E	*	H	E	*	H	F	*	I	F	*	I	G
2.76	**3.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		194	168	140	219	168	140	219	168	140	219	168	140	219	168	140	244	194	140
		*	G	E	*	G	E	*	H	E	*	H	E	*	H	F	*	I	F
2.51	**2.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		194	140	140	194	168	140	219	168	140	219	168	140	219	168	140	219	168	140
		*	F	D	*	G	E	*	G	E	*	G	E	*	H	E	*	H	F
2.26	**2.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3

		194	140	140	194	140	140	194	168	140	194	168	140	219	168	140	219	168	140
		I	F	D	*	F	D	*	G	D	*	G	E	*	G	E	*	H	E
2.01	**2.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		194	140	140	194	140	140	194	140	140	194	140	140	194	168	140	219	168	140
		I	E	D	I	E	D	*	F	D	*	F	D	*	G	D	*	G	E
1.76	**2.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	194	140	140	194	140	140	194	140	140	194	140	140	194	140	140
		H	E	C	I	E	D	I	E	D	I	F	D	*	F	D	*	F	D
1.51	**1.75**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	168	140	114	168	140	114	194	140	140	194	140	140	194	140	140
		H	D	C	H	D	C	H	E	C	I	E	D	I	E	D	I	E	D
1.26	**1.50**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		168	140	114	168	140	114	168	140	114	168	140	114	168	140	114	194	140	140
		G	D	B	G	D	C	H	D	C	H	D	C	H	D	C	I	E	C
1.01	**1.25**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	114	140	140	114	140	140	114	168	140	114	168	140	114	168	140	114
		F	C	B	F	C	B	G	D	B	G	D	C	G	D	C	H	D	C
0.01	**1.00**	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	1	2	3
		140	114	89	140	114	89	140	114	114	140	114	114	140	114	114	140	140	114
		E	B	A	E	C	A	E	C	B	E	C	B	F	C	B	F	C	B

Note:	
	No. of Posts
	Post diameter
	Foundation Type - Refer to Table 1200-1

4 Unless otherwise described in IM Appendix 12/1, posts shall be supported for a minimum of 3 days after placing the concrete and backfilling shall not take place until at least 48 hours after placing.

5 For traffic signals and illuminated signs provision shall be made for cable entry through the foundation by means of ducting as described in IM Appendix 12/1.

6 Where pockets are formed in concrete foundations their plan dimensions shall be sufficiently larger than those of the post to allow for positioning and bedding of the post and backfilling of the pocket.

7 All backfilling of foundations shall comply with Clause 609 except that where pipes or buried cables are installed it shall comply with Clauses 505 and 1421 respectively.

8 Reinstatement of existing surfaces above foundations shall comply with Clause 706.

9 Foundations for permanent traffic signs and signals shall be as described in IM Appendix 12/1 and unless otherwise stated, in compliance with this Clause.

10 All excavations for foundations shall be in compliance with Clause 604.

11 Grade ST2 concrete shall be placed in the bottom of the post hole until the planting depth in accordance with IM Appendix 12/1 is reached. The post shall be set vertically in the centre of the hole to the correct planting depth and the void filled to within 150mm of ground level with grade ST2 concrete in accordance with Clause 2602.

12 All backfilling of foundations shall comply with Clause 609, except that where ducts or buried cables are installed compliance shall be with Clauses 505 and 1421 respectively. Reinstatement of existing surfaces above foundations shall comply with Clause 706.

13 Posts shall be supported as required to ensure that the traffic sign post remains vertical during concrete curing.

14 For traffic signals and illuminated traffic signs, provision shall be made for cable entry through the foundation by means of 100mm diameter UPVC street lighting duct of 5mm wall thickness.

15 Where pockets are formed in concrete foundations, their plan dimensions shall be sufficiently larger than those of the post to allow for positioning and bedding of the post and backfilling of the pocket.

16 All posts and base plates shall be provided with the additional protection of a bitumen coating both internally and externally below ground level.

1204 Posts for Permanent Traffic Signs

1 All permanent sign plates shall comply with this Clause and the recommendations set in the UK National Annex of MSA EN 12899-1 steel posts shall be tubular or rectangular hollow sections complying with MSA EN 10210 and shall be manufactured from steel complying with grade S275 JO or S275 J2:

a) aluminium posts shall be tubular or rectangular hollow sections

b) passively safe posts shall be as agreed with the Overseeing Organisation.

2 All posts shall be fitted with a base plate and plastic end caps. The size of the base plate shall be sufficient to prevent rotation in the ground or foundation.

3 Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusion shall be kept to a minimum.

4 All electrical equipment shall be enclosed in a large base housing. Access to the interior shall be by means of a weatherproof door having tamper-resistant locks. The lower edge of the door shall be positioned so that when installed it is no less than 300mm above ground level and orientated to oppose oncoming traffic. In the case of signs supported by more than one post such compartment shall be on the post furthest from the carriageway.

5 All holes cut in posts to provide a route for internal wiring shall be bushed to prevent chafing of any wiring and suitably protected using a zinc rich material specifically designed to provide a rust inhibiting coating.

6 A suitable earthing stud, complete with two brass washers, a brass nut and lock nut, shall be provided on metal sign doors.

7 All brackets, clips and butting plates used in sign assemblies shall be manufactured from stainless steel. All screws, bolts, nuts and washers shall be stainless steel, but where these are in contact with materials which may be damaged by overtightening or electrolytic action, protective washers of nylon or other approved material shall be inserted.Posts shall be protected against corrosion in accordance with Clause 1221. All posts and base plates shall be provided with the additional protection of a bitumen coating both internally and externally below ground level.

8 Post types and brackets shall be as described in IM Appendix 12/1.

1205 Sign Plates for Permanent Traffic Signs

1 All permanent sign plates shall comply with this Clause and the recommendations set in the UK National Annex of MSA EN 12899-1 MSA EN 12899-1Plate signs not exceeding 1.2 m in height and 2.4 m width shall be made of a single sheet. Where more than one sheet is used to make up a sign, the number of sheets shall be kept to a reasonable minimum and the separate sheets shall be rectangular and of comparable size and shape.

2 Extruded plank signs up to 4.8 m wide shall have no vertical joints. Above this size, joints in extruded planks shall preferably be positioned at a vertical support; if not, then the vertical joints in adjacent planks shall not be less than 1.0 m apart and only one joint per extruded plank is permitted.

3 Fabricated plank signs up to 4.8 m wide shall have no vertical joints, but each plank may be constructed from a maximum of two pieces of sub-strate material, producing one split line. Split lines shall be lined up vertically or horizontally. Above 4.8 m wide, joints in the stiffening extrusions of adjacent planks shall preferably be positioned at a vertical support; if not, then the vertical joints in the stiffening extrusions of adjacent planks shall not be less than 0 m apart and only one such joint per fabricated plank shall then be permitted.

4 Where top and bottom light spill screens are required in IM Appendix 12/1, these shall extend for the whole width of the sign and be fabricated out of the same material as the sign plate.

5 Top and bottom light spill screens shall be considered as part of the sign plate and any stiffeners and mounting fittings shall be designed to accommodate the combined size.

1206 Faces for Permanent Traffic Signs

1 Faces for permanent traffic signs shall be as described in IM Appendix 12/1. They shall comply with MSA EN 12899-1MSA EN 12899-1 and with this Clause.

2 All plastics sheeting shall be fixed in accordance with the sheeting manufacturer's instructions.

3 Only vertical and horizontal joints shall be permitted and all joints in plastics sheeting shall be overlapped by not less than 6 mm. The overlap in the horizontal joints shall be from the top. Butt joints in plastics sheeting shall not be used, except between individual planks or in electrocutable overlay film, or as recommended by the sheeting manufacturer.

4 All materials comprising the sign face, including the background, border and legends shall be carefully matched for colour at the time of sign fabrication to provide uniform appearance both by day and night. The sheeting manufacturer's recommendations on colour matching methods shall be observed.

5 Letters, numerals, symbols and borders shall be clear cut, sharp edged and without cracks.

6 Any cut-out letters, numerals, symbols and borders shall be of material compatible with the sheeting to which they are applied. They shall be applied in accordance with the sheeting manufacturer's instructions.

7 Screen processed letters, numerals, symbols and borders shall be screen printed with materials in accordance with the sheeting manufacturer's instructions. Any inks, pastes and finishing coats used shall be compatible with the sheeting material or the face panel of internally illuminated signs.

8 Sheeting materials including letters, numerals, symbols and borders shall be fully adhered and there shall be no air bubbles, creases, cracks or other blemishes. Where the sheeting manufacturer requires the assembled materials to be provided with a coat of clear lacquer, it shall be uniform and continuous. All lacquer shall be applied at the time of fabrication of the sign face and shall be of a type specified or supplied by the sheeting manufacturer.

1207 Construction and Assembly of Permanent Traffic Signs

General

1 Construction and assembly of traffic signs shall comply with MSA EN 12899-1 and with this Clause.

2 All sign plates and planks, frames, purlins, posts and other components shall be de-burred prior to assembly.

3 Where framing and stiffening are not an integral part of the sign plate their joints shall be welded or joined with suitable brackets utilising nuts, bolts and washers.

4 Where purlins are adopted they shall be attached to each vertical member of the sign frame and the sign stiffening and framing shall be continuous in the vertical direction. Purlins shall be spaced equally apart. Connections shall be made at every point where a purlin crosses a post.

5 Where purlins are not adopted the sign stiffening and framing shall be continuous in the horizontal direction.

6 Rivets and other devices used for fixing sheet sign plates to their stiffeners or framework, or in the construction of housings, shall be of a material compatible with the materials being joined. Spacing of rivets or other fixing devices shall be uniform and shall not exceed 150 mm around the outside edge of any sheet or section of sheet and shall not exceed 300 mm on cross braces. Hollow rivets shall not be used. Where sign plates need to be stiffened this shall be achieved in a manner such that the sign face material is not punctured or otherwise damaged to accommodate the stiffening.

7 An additional washer of neoprene, nylon or other suitable material shall be used between the sign face and any metal nuts, bolts, washers and screws to protect it from corrosive or other damaging effects.

8 Where supports to traffic signs, including external lighting luminaires, are required to have flange plates these shall be secured by anchorages and attachment systems complying with Series 1300. The bolts shall be lightly greased before final installation and they and their anchorages shall be installed so as to achieve the loadings, torque settings and other requirements described in IM Appendix 12/1.

9 Sheet and plank signs shall be connected to posts by an appropriate method. Banding systems shall be of stainless steel complying with AISI Grade 201.

10 Plank signs shall be assembled in accordance with the manufacturer's instructions.

11 Where ferrous components are permitted any drilling of them shall be completed before the application of any finish.

12 Any hole drilled in plates with plastics sheeting to accommodate a rivet or bolt shall immediately prior to the insertion of the rivet or bolt have a clear lacquer, recommended by the plastics sheeting manufacturer, applied to its edge to prevent the ingress of moisture. The surfaces of rivets or bolts exposed on the sign face shall be covered by a suitable material of a colour to match that part of the face.

13 Prior to fitting any sign to any lighting column, the Contractor shall ensure that the sign is included in the technical approval of the lighting column in accordance with the Technical Approval Scheme adopted by the Overseeing Organisation. No holes shall be drilled in the lighting column except those whose location and size are included in the technical approval.

14 Traffic signs to be erected on road lighting columns shall have fixings compatible with the column cross-section and finish. Wiring shall be contained in external conduit complying with BS 4568. Conduits shall be affixed to concrete lighting columns with stainless steel banding systems complying with AISI Grade 201. Conduits shall be affixed to other lighting columns with stainless steel clamps which shall be screwed with stainless steel screws into tapped

holes in the lighting column. Alternatively, permanent cabling shall be placed on the inside of the lighting column and shall exit via a bushed drilled hole.

Variable Message Traffic Signs

15 Variable message traffic signs shall comply with this Clause.

1208 Location and Erection of Permanent Traffic Signs

1 The approximate location of each traffic sign is described in IM Appendix 12/1. All traffic signs shall have their exact location determined and recorded in compliance with Clause 1403.

2 All posts shall be erected plumb and where two or more posts are provided for any one sign, the faces of the posts shall be lined up.

3 Signs erected on two posts shall have each post positioned so that the distance from the centre of the post to the edge of the sign plate is 300 mm unless otherwise described in IM Appendix 12/1.

4 Any pockets formed in concrete foundations to receive the posts shall be cleaned out immediately prior to erection. The posts shall be placed centrally in the pockets and be bedded on mortar designation (i) complying with Clause 2404 and, unless otherwise described in IM Appendix 12/1, the pockets shall be filled up to finished foundation level with mix ST5 concrete.

5 Traffic signs mounted on posts, except those on gantries, shall be erected to have their face plumb and be orientated in relation to the carriageway in accordance with Chapter 1 of the Traffic Signs Manual.

6 Traffic signs mounted on gantries shall be erected as described in IM Appendix 12/6 and all other traffic signs shall be erected as described in IM Appendix 12/1.

7 The site records required by Clause 1402, shall include daily records for non-lit traffic signs.

8 No traffic sign shall be dismantled, resited or removed without the prior approval of the Overseeing Organisation.

1209 Covering of Permanent Traffic Signs

1 Where it is required in IM Appendix 12/1 that permanent traffic signs be blanked-out or have an alternative message, the method to be adopted shall comply with the following, unless otherwise described in IM Appendix 12/1:

a) for plate signs: A cover plate compatible with the plate sign's material, or a covering of a suitable, opaque, non damaging material, or, for covering periods of up to one year, a self adhesive plastic film to support the temporary sign face sheeting;

b) for other traffic signs: A covering of a suitable, opaque, non damaging material.

2 Cover plates shall be suitably fixed to give a 10 mm minimum air gap between the sign face and cover plate. The fixing method shall not cause damage or staining to the sign face. Any

holes remaining in the finished sign face after removal of the plate shall be filled with a suitable material, of a colour to match that part of the face.

3 Where self adhesive plastic film is used it shall be compatible with the sign face materials and be applied and removed in compliance with the manufacturer's instructions.

4 Any loose covering used must be sufficiently opaque to prevent reflection from and legibility of the covered sign and be securely fastened to the back of the sign. Under no circumstances shall tape or other adhesive material be applied to the face of the sign. Sufficient space shall be left between the covering and the face to permit air flow over the sign.

5 Traffic signs which are to be covered shall not be erected on trafficked highways without the covering in place.

6 Removal of any covering shall be carried out with the minimum disturbance to traffic.

7 Irrespective of any requirement in IM Appendix 12/1 to cover signs, any traffic sign erected at such a time that its legend does not relate either wholly or in part to the traffic movement and route in operation, shall have its sign face securely covered with one of the materials in sub-Clause 1 of this Clause until such time as its legend is applicable.

1210 Permanent Traffic Bollards

1 Permanent traffic bollards shall incorporate a prescribed traffic sign unless otherwise specified in IM Appendix 12/1.

2 Traffic Bollards shall be Type A retroreflective self-righting bollards (RSRB's) as specified in BS 8442 unless otherwise specified in IM Appendix 12/1.

3 Retroreflective fluorescent yellow conspicuity panels shall be installed only on the front and side faces of Traffic Bollards unless otherwise specified in IM Appendix 12/1.

4 All faces of Traffic Bollards which are not signs or conspicuity panels shall be coloured black

5 Internally illuminated bollards, when instructed, shall comply with MSA EN 12899-2 and be of the uplighter variety. They shall be vertically installed, assembled, correctly orientated, connected and left in good working order, strictly in accordance with the manufacturer's instructions. Uplighters shall be securely fixed with rag bolts in their correct positions.

1211 Permanent Marker Posts

Hazard Marker Posts

1 Hazard marker posts shall be Type D3 or D4 to MSA EN 12899-3 and comply with the classes recommended in the UK's National annex to that standard.

2 The reflectors shall be Type R1, Class 3 and comply with Diagram 560 of the UK's Traffic Signs and General Directions. The retroreflective sheeting shall be protected from damage from overrunning vehicles by raised edges or other acceptable methods.

3 The hazard marker post shall be installed so that its top is between 750mm and 1000mm above ground level, unless otherwise required by the Client, and it shall present a projected width of not less than 100mm.

Distance Marker Posts

4 Distance marker posts shall be made from hard-wearing polymer and shall be supplied and installed with a ground socket or mounted on a safety fence in compliance with the distance marker post manufacturer's instructions.

1212 Road Markings

General

1 Road markings shall be white or yellow (Classes Y1 and Y2) complying with MSA EN 1436 Table 6, as appropriate except where an alternative shade has been specified in IM Appendix 12/3. The markings shall consist of continuous or intermittent lines, letters, figures, arrows or symbols and comply with sub-Clauses 2 to 8 of this Clause.
Statutory requirements controlling road markings are contained in KAP 65.05.

Permanent Road Markings

2 Permanent road markings shall be one of the following materials and comply with the colour, location and material type requirements described in IM Appendix 12/3:

a) thermoplastic road marking material or paint in accordance with MSA EN 1871;
b) permanent preformed road markings in accordance with MSA EN 1790;
c) other materials as described in IM Appendix 12/3.

They shall be also tested in road trials to the Roll-over class P5 in accordance with the procedure stated in MSA EN 1824 to demonstrate compliance with the performance requirements as stated in sub-Clauses 3 to 6. The test report shall give particulars of the quality and quantity of the material, including drop on glass beads laid at the test site for future reference and comparison purposes should such a need arise.

3 Road markings shall have the following road performance as defined in MSA EN 1436 for the period of the functional life starting from the date of application or when the road is trafficked, whichever is later. The materials to be used shall be to the same mix, material quality, quantity and rate of application as used on the test site.

Table 1200-7: Requirements of Screed, Spray

Property	MSA EN 1436 Reference	Requirement	Value
Colour	Table 6	1. White	x, y co-ordinates given

		2. Yellow Class Y1, Y2	x, y co-ordinates given
Luminance Factor	Table 5	1. Class B2	0.3
		2. Class B1	0.2
Skid Resistance	Table 7	1. Class S2	50
		2. Class S2	50
Retro reflectivity	Table 2 Class of RL for dry markings	1. Class R2	100
		2. Class R1	80
Softening Point of screeded thermoplastics	Table 6 of MSA EN 1871	1. SP4	$>110^{0C}$
		2. SP4	$>110^{0C}$

* Note: 1 = White, 2 = Yellow

4 The width tolerances and thickness for screed, spray, preformed and extruded white or yellow lines shall be in accordance with The UK's Traffic Signs Regulations and General Direction 2016. With the exception of the road markings listed in Regulation 32 (2) of The Traffic Signs Regulations and General Directions, in no case shall any materials be laid more than 6 mm thick. Unless specified, all white markings shall be reflectorised with glass beads in accordance with MSA EN 1423 and MSA EN 1424 by incorporation (apart from preformed markings) into the road marking mixture and to the wet surface of the marking. The glass beads shall not have more than 1,000 ppm of Arsenic Trioxide, 200 ppm of Lead and 1,000 ppm of Antimony. The Contractor shall supply test certificates showing compliance with these requirements.

5 Where there is requirement for improved visibility in wet conditions at night, products showing the following performance in addition to that stated in sub-Clause 3 shall be used.

Table 1200-8: Requirement for improved visibility in wet conditions at night

Property	MSA EN 1436 Reference	Requirement	Value
Retro reflectivity	Table 3	Class RW3	50

6 Where there is a requirement for improved skid resistance as referred to in IM Appendix 12/3 products showing the following performance in addition to that stated in sub-Clause 3 shall be used.

Table 1200-9: Requirement for improved skid resistance

Property	MSA EN 1436 Reference	Requirement	Value
Skid Resistance	Table 7	Class S3	55

7 The pavement shall be prepared in accordance with the following:

a) Where the marking is to be applied on concrete carriageways, the transverse texturing shall be freed from all traces of curing compound by wire brushing or other approved

means. Prior to the application of the thermoplastic material a tack coat compatible with the road surface and the marking material shall be applied in accordance with the manufacturer's instructions.

b) On surface dressed carriageways, all loose chippings where the marking is to be applied shall be removed prior to application.

8 The application of permanent road markings shall be in accordance with the Sector Scheme described in IM Appendix A. Road marking materials shall only be applied to surfaces which are clean and dry. Markings shall be free from raggedness at their edges and shall be uniform and free from streaks. Longitudinal road markings shall be laid to a regular alignment.

Temporary Road Markings

9 Temporary road markings shall only be used with the prior approval of the Overseeing Organisation. They shall comply with Sub-Clauses 2 to 8 above and be constructed from either:

a) a proprietary preformed road marking material complying with MSA EN 1790 and assessed as removable under that standard, or

b) paint to MSA EN 1871.

10 When temporary road markings are used on surfaces that will continue to be used by public traffic after their removal, any shadow trace remaining after their removal shall be permanently obliterated. Preformed materials shall not be used for this obliteration. Upon removal they shall be disposed of off-site and if any making good is necessary to the road surface it shall be satisfactorily carried out before the road is opened to traffic.

11 Temporary road markings constructed from a preformed road marking material or paint shall only be applied to surfaces that are clean and dry. The marking material shall be new and, together with any primer, shall be stored and installed in accordance with the manufacturer's instructions and within the recommended shelf life.

Masking of Existing Road Markings

12 The Contractor's proposed method of masking existing road markings shall be agreed with the Overseeing Organisation.

13 When black masking materials are required to cover existing permanent road markings, they shall comply with BS 7962 other than for specular gloss where they shall have an initial value for specular gloss of no greater than 3, and a retained value following exposure to traffic of no greater than 3. The total thickness of original and masking materials shall not exceed 6mm.

Removal of Road Markings

14 The removal of road markings on surfaces that will continue to be used by traffic shall be undertaken in a manner that will avoid damage to the surface.

15 The removal of temporary road markings shall comply with sub-Clauses 10 and 11 of this Clause.

16 For bituminous running surfaces, the removal of permanent road markings shall be by mechanical means or forced air abrasive (shot blasting) only. Hot Compressed Air (HCA) lance shall be permitted on other types of running surfaces. In all cases the Contractor shall submit details of the proposed method for the Overseeing Organisation's consent.

Longitudinal Road Markings Lateral Tolerances

17 For longitudinal road markings, the lateral tolerance shall be within ± 25mm from the designed position. Any discontinuities between road markings shall be replaced with a smooth taper from one road marking to the other. The length of the transition shall be derived from table below. All road markings shall comply with the dimensions, angles and proportions stated in the Traffic Signs Regulations and General Directions 2016.

Table 1200-10: Length of transition for discontinuities in road markings

Speed Limit (kph)	Taper
50	1 in 40
64	1 in 40
70	1 in 45
80	1 in 45

1213 Road Studs

Retroreflecting Road Studs

1 Requirements controlling retroreflecting road studs (both permanent and temporary) are contained in the Traffic Signs Regulations and General Directions 2016

2 All retroreflecting road studs shall be installed in accordance with the manufacturer's instructions.

Permanent Retroreflecting Road Studs

3 Permanent retroreflecting road studs shall be installed at the locations shown in the design drawings, or as instructed by the *Overseeing Organisation*. Permanent road studs shall be tested to MSA EN 1463-2, and achieve a performance rating of S1, R1, and DV1. Permanent retroreflecting road studs shall be Type A (non-depressible) of MSA EN 1463-1 and be one of the types described in IM Appendix 12/3. Permanent retroreflecting road studs shall comply with performance classes PRP1, NCR1, and DCR1 and all other requirements of that standard.

Temporary Retroreflecting Road Studs

4 Non retroreflecting road studs are not permissible for use in the works" Non retroreflecting Road Studs

5 All non-retroreflecting road studs shall be installed in accordance with the manufacturer's instructions in locations, and complying with any other requirements, described in IM Appendix 12/3.

1214 Traffic Cones, Traffic Cylinders, Flat Traffic Delineators and Other Traffic Delineators

General

1 Traffic cones and traffic cylinders, hereinafter termed cones and cylinders, shall comply with Designation 1 or Designation 2 of MSA EN 13422.

2 Flat Traffic Delineators, hereinafter termed FTDs, shall comply with sub-Clauses 3 to 17 of this Clause.

3 An FTD shall comprise a flat blade fixed to a base. The flat blade may incorporate stiffeners provided that they do not encroach into the white retroreflective area.

4 FTDs shall be constructed of rubber or plastic materials. It shall be possible to insert and remove blades without requiring a special tool. The height of the FTD shall be 750 mm or 1000 mm as stated in IM Appendix 12/4. The width of the top of the blade shall be 45 ± 10 mm. Other dimensions shall be in accordance with Diagram 7102 of TSRGD 2016

5 FTD bases shall be so designed that they will stack without binding and without causing damage to the retroreflective surfaces. Additionally, the blades and their attachment to the base or fixing shall be so designed that the blade's face presents throughout its design life a plane to the approaching traffic no more than 12.5° from the vertical.

6 FTD bases may be coloured red, black, grey or brown. They may have a 100 mm wide white reflective line placed on one edge of the base provided:

a) the edge of the base where the white line is to be attached comprises a sloping surface which is at an angle to the road surface of no more than 60° and is of such dimensions either to fully accommodate the 100 mm wide white line or, where the angle between the road surface and the sloping surface exceeds 30°, to accommodate at least 80 mm of the width of the white line, the excess (maximum 20 mm) being returned onto the top surface of the base;

b) the material from which the base is manufactured allows proper adhesion or attachment of the white reflective line to prevent it becoming detached during normal use;

c) the coverage of white reflective material is maintained at more than 70% of the area treated.

7 The white reflective strip material shall comply with MSA EN 1436 and MSA EN 1871 or MSA EN 1790 as appropriate. Additionally, when tested using a portable retroreflectometer the white line shall have a coefficient of retroreflectance of Class R2 or better to Table 2 of MSA EN 1436.

8 FTD blades shall be coloured red and white as indicated in Diagram 7102 of TSRGD 2016

9 The white portions of the FTD blades shall comply with the chromaticity co-ordinates and luminance factor given in MSA EN 12899-1.

10 The red portions of the FTD shall comply with the chromaticity co-ordinates and luminance factor for traffic cones given in MSA EN 13422 when measured in accordance with BS 873 : Part 1.

11 That part of the blade coloured white shall comprise retroreflective material, complying with the requirements for Class 1 or Class 2 as specified in MSA EN 12899-1, which shall be securely applied or attached to the blade to prevent it becoming detached during normal use.

12 The red portions may also be retroreflective.

13 The minimum mass of the FTD including any ballast recommended by the manufacturer shall comply with the mass of a traffic cone as defined in MSA EN 13422.

14 FTDs shall be clearly and durably marked with the following information in the following order:

a) the name, trade mark or other means of identification of the manufacturer or vendor;

The marking shall be in characters legible at a normal reading distance such that the total area of the marking does not exceed 30 cm².

15 All markings shall be sufficiently durable to last the expected life of the FTD to which they are applied and in no case less than 5 years.

16 When checked by inspection and by rubbing lightly, first for 15 seconds with a piece of cloth soaked in water and then for 15 seconds with a piece of cloth soaked in petroleum spirit, followed by 15 seconds with a piece of cloth soaked in diesel oil, the marking shall still be legible.

17 FTDs shall be supplied with the following information:

a) instructions for ballasting (if required);

b) instructions for fixing blades to bases.

18 Other traffic delineators hereinafter termed delineators shall be as described in IM Appendix 12/4.

19 The Contractor shall submit to the Overseeing Organisation a copy of a test certificate confirming that samples of the identical type of cone, cylinder, FTD or delineator as those to be used in the Works and supplied as permanent cones, cylinders, FTDs or delineators under the Contract, have been tested and found to comply with sub-Clauses 1 to 18 of this Clause.

Permanent Cones, Cylinders, FTDs and Other Delineators

20 Where required in IM Appendix 1/5 the Contractor shall arrange for the tests described in sub-Clauses 22 to 56 of this Clause, for cones, cylinders, FTDs and other delineators, to be carried out at an approved testing laboratory. The numbers to be tested, as given in IM Appendix 1/5, are to be selected at random from the batch to be supplied under the Contract. Failure of any test will result in rejection of the batch.

Temporary Cones, Cylinders, FTDs and Other Delineators

21 The Contractor shall submit to the Overseeing Organisation certification substantiating that at least 1 in every 500 of any batch of cones, cylinders, FTDs and delineators to be used in the Temporary Works have passed the tests described in sub-Clauses 22 to 56 of this Clause as appropriate.

Testing

22 Cones and cylinders shall be tested in compliance with MSA EN 13422.

23 FTDs shall be tested in compliance with sub-Clauses 24 to 55 of this Clause.

24 Test procedures shall be carried out on each size of FTD and each method of attachment between blade and base.

25 When tested in accordance with sub-Clauses 31 to of this Clause with the exception of the white retroreflective material, no part of the FTD shall crack, split or deform.

26 When samples with retroreflective portions attached are tested in accordance with sub-Clauses 31 to 38 of this Clause the coefficient of luminous intensity, R (as defined in Publication CIE No 54; Retroreflection, definition and measurement), after testing shall be not less than 80% of the value previous to the test.

27 When tested in accordance with sub-Clauses 39 to 43 of this Clause, no part of the FTD with the exception of white retroreflective material, shall crack, fracture or split and any ballast or ballast container shall not have become displaced within the base or separated from it. Any ballast container as either an integral part of the base or enclosed within it shall not have been damaged to the extent that ballast is discharged. Caps or bungs to ballast containers shall not have been forced from their sockets or other fixings.

28 When tested in accordance with sub-Clauses 44 to of this Clause, no part of the FTD with the exception of white retroreflective material shall crack, fracture or split. Bases shall remain in contact with the reference surface.

29 When tested in accordance with sub-Clauses 50 to 55 of this Clause, no part of the FTD with the exception of the white retroreflective material shall crack, fracture or split. Bases shall remain in contact with the reference surface.

30 Throughout the tests in sub-Clauses 31 to 38, 44 to 49, and 50 to 55 of this Clause, the blade shall remain fixed in position. On completion of the testing in accordance with sub-Clauses 44 to 49 and 50 to 55 of this Clause the residual deflection of the top of the blade in any horizontal direction, measured 30 seconds to 60 seconds after completion of the tests, shall be not more than 12.5% of the height of the FTD. The height of the FTD, H, is as measured from the reference surface.

Low Temperature Impact Test

31 The test shall be conducted using a steel ball swung on a pendulum. The apparatus shall be as shown in HCD Drawing Number K3. The steel ball shall have a mass of 0.9 ± 0.045 kg and

be suspended by one or two steel pendulum wires of not more than 1 mm diameter so that the pendulum radius is 1750 ± 10 mm. The point of impact shall be vertically beneath the centre of radius of the pendulum and at a height on the specimen of H/2 ± 10 mm where H is the height of a FTD above the reference surface.

32 FTDs shall be fixed to the reference surface using the base.

33 The test shall be carried out on specimens with and without retroreflective portions attached.

34 For samples with retroreflective portions attached, the coefficient of luminous intensity, R, of every such face at an observation angle of 20° and at an entrance angle normal to the face of the blade prior to the conditioning shall be determined; the definitions of observation angle and entrance angle being those given in BS 873: Part 1.

35 All test samples shall be conditioned for a period of not less than 2 hours at a temperature of -16 ± 2°C. Impact testing shall be carried out within 60 seconds after conditioning.

36 Impact shall be made in ambient conditions of not greater than 20°C.

37 Within 1 hour of impacting, samples shall be immersed with retroreflective portions attached, in water at 20 ± 5°C for 10 minutes. After draining for 10 minutes the coefficient of luminous intensity, R, shall be measured in accordance with sub-Clause 34 of this Clause.

38 The sample shall be examined and any damage, percentage change in the coefficient of luminous intensity, or any detachment of a blade from its base shall be reported.

Drop Test

39 FTDs requiring the addition of ballast shall be ballasted as instructed by the manufacturer.

40 The FTD shall be conditioned for a period of not less than 2 hours at a temperature of 32 ± 2°C.

41 Within 1 minute after conditioning the FTD shall be suspended with its normal vertical axis horizontal (any cap or bung to a ballast container forming an integral part of the FTD shall be positioned uppermost) and with its lowest part 1500 ± 5 mm above a solid horizontal surface and dropped once vertically from rest onto the solid surface.

42 The test detailed in sub-Clause 41 shall be repeated after conditioning at a temperature of -16 ± 2°C.

43 Any damage observed shall be reported.

Bending Test

44 The test shall be carried out on specimens with and without retroreflective portions attached.

45 The blade shall be fixed to the base in accordance with the manufacturer's instructions. The blade and its base shall be conditioned for a period of not less than 2 hours at a temperature of -16 ± 2°C. Within 1 minute after conditioning, the blade shall be bent over about its base line by applying a force to the face of the blade at a point on its vertical centre line H/2 ± 10 mm from the top, so that the top edge touches the reference surface or a surface coplanar with it as indicated in the HCD Drawing Number K3. H is the height of the FTD. When the top

edge of the blade touches the reference surface the bending force shall be removed immediately.

46 From 30 seconds to 60 seconds after completion the maximum residual horizontal deflection of the top of the blade shall be measured from the vertical axis passing through the centre of the base of the blade and perpendicular to the reference surface.

47 The test shall be repeated in the opposite direction.

48 The procedure in sub-Clauses 45 to 47 of this Clause shall be repeated at a temperature of 32 ± 2°C.

49 The deflections, any damage observed, any detachment of the blade from its base, and any movement of the base shall be reported.

Fatigue Test

50 The test shall be carried out on specimens with and without retroreflective portions attached. This test is to be carried out on a different specimen to that or those tested in sub-Clauses 31 to 38 and 44 to 49 of this Clause.

51 The blade shall be fixed to the base in accordance with the manufacturer's instructions. The test shall be carried out after conditioning the blade and its base for a period of not less than 2 hours at a temperature of -16 ± 2°C.

52 By applying a force to the face of blade at a point on its vertical centre line H/2 ± 10 mm from the top, the top of the blade shall be oscillated as indicated in the HCD Drawing Number K3 at a frequency of 60 oscillations per minute to 90 oscillations per minute at an amplitude of H/4 for 10 minutes with the reference surface held in a horizontal position. H is the height of the FTD. One oscillation is the movement from the upright position to the maximum amplitude in one direction, then to the maximum amplitude in the opposite direction and then the return to the upright position.

53 From 30 seconds to 60 seconds after completion the maximum residual horizontal deflection of the top of the blade shall be measured from the vertical axis passing through the centre of the base of the blade and perpendicular to the reference surface.

54 The procedure in sub-Clauses 51 to 53 of this Clause shall be repeated at a temperature of 32 ± 2°C.

55 The deflection, any damage observed and any detachment of the blade from its base shall be reported.

56 Other traffic delineators shall be tested in compliance with IM Appendix 12/4.

1215 Road Danger Lamps and High Intensity Flashing Beacons

1 Road danger lamps and high intensity flashing beacons shall be used in accordance with Regulations 55 and 54 respectively of the UK's TSRGD 2016.

1216 Temporary Traffic Signs

1 Temporary traffic signs shall be designed by the Contractor, comply with Clause 1201, satisfy Clause 117, have the consent of the Overseeing
Organisation prior to installation and comply with sub-Clauses 2 to 6 of this Clause.
Temporary traffic signs shall comply with The UK's Traffic Signs Regulations and General Directions 2016, and be designed in accordance with Working Drawings for Traffic Sign Design and Manufacture.

2 Temporary traffic signs shall be constructed as follows:

a) plate signs and internally illuminated signs:
   i) the coefficient of retroreflection of the material for the faces of signs used for Standard and Relaxation works, as defined in Chapter 8 (Part 1 Design) of the Traffic Signs Manual, and any amendment thereto including the amendments specified in sub-Clause 117.8, shall be as given in MSA EN 12899-1 for Class 1 material;
   ii) where the sign is to be erected for less than 6 months, it shall, unless IM Appendix 12/1 requires it to be constructed to a similar standard as a permanent sign, be either a portable sign complying with MSA EN 12899-1 or a fixed short life sign complying with sub-Clause 3 of this Clause;
   iii) where the sign is to be erected for periods of 6 months or more, or where IM Appendix 12/1 requires it to be constructed to the standard for a permanent sign, it shall comply with the requirements for permanent traffic signs;
   iv) in addition to either (i) or (iii) above, electrical work related to temporary traffic signs shall comply with the Series 1400 except Clauses 1402, 1410 and 1425;

b) bollards and marker posts shall comply with Clauses 1210 and 1211;

c) road studs:
   i) temporary retroreflecting road studs shall comply with Clause 1213 and only be installed for periods of up to 3 months and thereupon be replaced;
   ii) if permanent retroreflecting road studs are used for temporary purposes they shall comply with Clause 1213;

d) road markings, cones, cylinders and delineators, road danger lamps and high intensity flashing beacons shall comply with Clauses 1212, 1214 and 1215 as appropriate;

e) portable traffic signals and haul route crossing signals shall, where relevant, comply with Clause 1217;

f) any other signal, lamp, barrier or device shall be suitable for its intended purpose and where relevant shall comply with appropriate British Standards.

3 Fixed short life signs shall be constructed as follows:

a) materials:
   i) sign plates may be constructed of materials to the standard for a permanent sign, or alternatively shall be constructed of timber, hardboard, plywood or chipboard;

ii) stiffening frames for sign plates constructed of timber, hardboard, plywood or chipboard, shall be constructed of timber, mild steel or aluminium sections;

iii) mounting posts shall be constructed of steel, cast iron, aluminium alloy, reinforced or prestressed concrete or timber;

iv) fittings for signs made of materials to the standard for a permanent sign shall be similar to those used for permanent signs. For signs made of timber, hardboard, plywood or chipboard, fittings shall be of steel, stainless steel, or brass wood screws, or wire nails. Adhesives may be used for fixing provided they are weatherproof and are not affected by variations in temperature;

v) sign plates constructed of timber, hardboard, plywood or chipboard shall be sealed or otherwise treated to ensure that the final finish will provide a satisfactory appearance and will not deteriorate during the period the sign is expected to be in use;

b) construction:

i) sign plates shall be constructed on similar principles to those required for permanent signs, although stiffening may be omitted provided the sign plate passes the bending test given in BS 873: Part 1;

ii) stiffening frames constructed of timber members shall be jointed so that they withstand adverse weather conditions;

iii) mounting posts constructed of timber shall have dimensions that are sufficient to withstand the estimated loading on the sign;

iv) fixing of signs to the stiffening frame where required, and to the mounting posts shall be by screwing, nailing or gluing;

v) timber sign plates, stiffening frames and mounting posts shall be preserved with copper/chrome/arsenic (CCA) complying with BS 4072. The sign plate face shall be finished to comply with MSA EN 12899-1.

4 Erection of temporary traffic signs mounted on posts shall comply with Clause 1208.

5 Any temporary covering of temporary traffic signs shall comply with Clause 1209. Any temporary covering of road studs and road markings shall comply with any requirements described in IM Appendix 12/3.

6 Removal of temporary traffic signs shall be carried out as soon as they become superfluous or a hazard to traffic. Methods of removal shall ensure the minimum disturbance to traffic consistent with safety. Making good shall be carried out immediately after removal of the traffic sign.

7 Posts shall not protrude above the top of the sign unless supporting an external luminaire, in which case the protrusion shall be kept to a minimum.

1217 Traffic Signals

General

1 Traffic Signals and Box Signs shall comprise road junction signals, puffin, toucan and Pegasus crossing signals, wig-wag signals, variable message and over-height vehicle box signs and shall be as described in IM Appendix 12/5.

2 Traffic signals shall comply with sub-Clauses 3 to 15 of this Clause and the requirements described in IM Appendix 12/5. The installation and maintenance of traffic signals shall be in accordance with the quality management scheme described in IM Appendix A.

3 Traffic signal equipment shall comply with MSA EN 12368 . It shall consist of control equipment including detector loops of a type which has received statutory type approval by Transport Malta or subsequent transport authority bodies in Malta in accordance with the procedure described in KAP.60. and S.L.65.05. Traffic signal equipment with such statutory type approval shall be deemed valid for use in Northern Ireland. They shall be maintained and serviced as described in IM Appendix 12/5.

4 All traffic safety and management measures associated with work on traffic signals shall comply with Clause 117, and any work entailing the switching off of existing signals shall not be carried out until the highway authority has been informed and until agreed alternative traffic management measures are in operation to safeguard and control vehicles using the highway.

Controllers

5 Controllers shall be provided and installed as described in IM Appendix 12/5. The cabinet shall be mounted on a foundation, with or without an adjacent inspection chamber as described in IM Appendix 12/5. The foundation shall make provision for the entry of the appropriate number of cable ducts.

6 Traffic signal controllers shall, in addition to any testing carried out in compliance with Clause 1424 be tested before delivery to Site and again after installation but before commissioning, to ensure they comply with the specification in IM Appendix 12/5.

Cabling and Electrical Requirements

7 Traffic signal equipment on each post shall be connected to the controller in accordance with the requirements described in IM Appendix 12/5.

8 The installation shall comply with SL 545.24 Electrical Installations Regulations and regulations of the electricity supplier which provides the supply.

9 Cables shall be PVC insulated and sheathed 600/1000 V grade with steel wire armouring to BS 6346 and shall be installed in ducts in compliance with Clause 1421 and terminated in compliance with Clause 1423. Reinstatement shall be in compliance with Clause # 706.

10 Earthing of all posts, pushbutton boxes and the controller cabinet shall comply with Clause 1420. One conductor in each cable between a post and the equipment cabinet shall be a protective conductor and shall bond the earth terminal at the post to the main earth terminal.

11 Cable testing shall be in accordance with Clause 1424. Tests (a), (b), (c), (e), (f), (g), (h) and (j) as defined in sub- Clause 1424.2 shall be conducted and all measurements recorded.

Telecommunications Carrier Interface

12 Where a connection interface to the plant of a telecommunications carrier is specified in IM Appendix 12/5 the installation shall comply with the rules and regulations of that carrier.

Posts

13 Posts for traffic signals shall be installed in compliance with Clause 1203 and in the locations specified in IM Appendix 12/5.

Signal Heads

14 All backing boards shall have a border of Class 1 retroreflective material (white). Pressure sensitive material shall normally be supplied but vacuum applied material may be used in accordance with the manufacturer's process. Application of pressure sensitive material shall take place only on dry surfaces. An ambient temperature of 15°C minimum is recommended for satisfactory adhesion. The material shall have a 50 mm width throughout. Where the continuous border bridges each backing board/signal head a distinct cut edge shall be made to avoid any subsequent stretching/ shrinkage of dissimilar surfaces. The finished border shall be of a neat appearance and not made up of short lengths of cuttings.

Road Markings

15 Road markings associated with traffic signals shall comply with Clause 1212.

1218 Detector Loops

16 The installation and testing of detector loops shall be in accordance with the Overseeing Organisations requirements at the time.

1219 Controlled and Un-controlled Crossings

17 The location of controlled and un-controlled crossings shall be as described in IM Appendix 12/5. Details shall be as described in IM Appendix 12/5.

18 Surfacing of Zebra crossing areas shall be laid with materials and to methods specified in IM Appendix 12/5. The finished surfacing shall have a minimum skid resistance Class of S4 when tested in compliance with MSA EN 1436.

19 Non retroreflecting road studs shall comply with Clause 1213.

20 Road markings shall be white and comply with Clause 1212 for permanent markings and be of the material described in IM Appendix 12/5.

21 Traffic signals, related control and other equipment where incorporated in controlled crossings together with installation and reinstatement shall comply with Clause 1217 for permanent traffic signals.

1220 Traffic Signs on Gantries

1 Where traffic signs (including signals) are erected on gantries the signs shall comply with the requirements of the relevant Clauses of this Series.

2 Fabricated steel gantries shall be constructed to the requirements described in IM Appendix 12/6, and to comply with Series 1800. Reinforced or prestressed concrete gantries shall be as described in IM Appendix 12/6 and shall comply with Series 1700.

1221 Preparation and Finish of Metal and Other Surfaces

General

1 Permanent traffic signs and, where specified in IM Appendix 12/1 prescribed temporary traffic signs shall be prepared, protected against corrosion and finished in compliance with MSA EN 12899-1 and with sub-Clauses 2 to 9 of this Clause.

Faces

2 Faces of sign plates shall be prepared to receive sign face materials in compliance with MSA EN 12899-1 and to the recommendations of the sign face material manufacturer following completion of any preparation and finish in sub-Clauses 3 and 6 of this Clause.

Steel Sign Plates, Purlins, Frames and Fittings

3 Steel sign plates, frames and fittings and purlins shall be prepared and protected in compliance with MSA EN 12899-1 and be as described in IM Appendix 12/1. Preparation to clean steel 2nd Quality and painting of surfaces shall comply with Series 1900.

Steel Posts and Post Housings

4 Steel posts and post housings shall be prepared and protected in compliance with BS 873 : Part 7. Painting shall comply with Series 1900 and be as described in IM Appendix 19/2.

Aluminium or Aluminium Alloy Posts and Post Housings

5 Aluminium or aluminium alloy posts and post housings shall, unless otherwise required in IM Appendix 19/2, be left unpainted, except for the bituminous coating required by BS 873: Part

7 below ground level. A matt appearance shall be achieved in accordance with sub-Clause 6 (b) of this Clause.

Aluminium or Aluminium Alloy Sign Plates, Framework and Stiffening and Luminaire Housings

6 Backs of aluminium or aluminium alloy sheet and planks forming plate signs and external parts of luminaire housings and other permanently exposed components shall, to prevent specular reflection, be dulled using a method to be agreed by the Overseeing Organisation or be coated with either paint or plastics as follows:

a) plastics coating, and pre-treatment before its application, shall be in compliance with MSA EN 12899-1;

b) surfaces to be painted shall be lightly abraded in accordance with sub-Clauses 1903.5 and 1903.6 or degreased and etch primed with primer detailed in Series 1900 Table 1900-2, Item No. 14 Except for etch primed surfaces, all surfaces shall be immediately cleaned in accordance with sub-Clause 1903.9. All surfaces, including etch primed surfaces, shall be applied with one coat of matt polyurethane paint to Series 1900 Table 1900-2, Item No. 168, and colour as described in IM Appendix19/2. The paint application shall comply with the appropriate recoat times (over etch primer) as detailed in the paint manufacturer's data sheet and Clauses in Series 1900.

Internally Housed Electrical Components and Ancillary Equipment

7 Ferrous steel shall be finished inside and out by galvanizing, electro-plating or zinc or aluminium spray all in accordance with Series 1900, or other equivalent preparation and finish. Aluminium and other metals shall unless otherwise required in IM Appendix 14/4 be left untreated.

Stainless Steel Components

8 Unless otherwise required in IM Appendix 19/2 stainless steel shall be left untreated except where the component is visible against the sign face when it shall be covered by a suitable material, of a colour to match that part of the face.

Cast Iron and Cast Steel Components

9 External surfaces shall be prepared and protected as described in IM Appendix 19/2. Cabinets and feeder pillars shall have final coats of paint applied on Site after final installation including the fitting of any internal apparatus required as part of the Permanent Works. Internal surfaces shall unless otherwise specified in IM Appendix 19/2 receive the same treatment as for external surfaces except that final paint coats shall be applied before internal components are installed.